

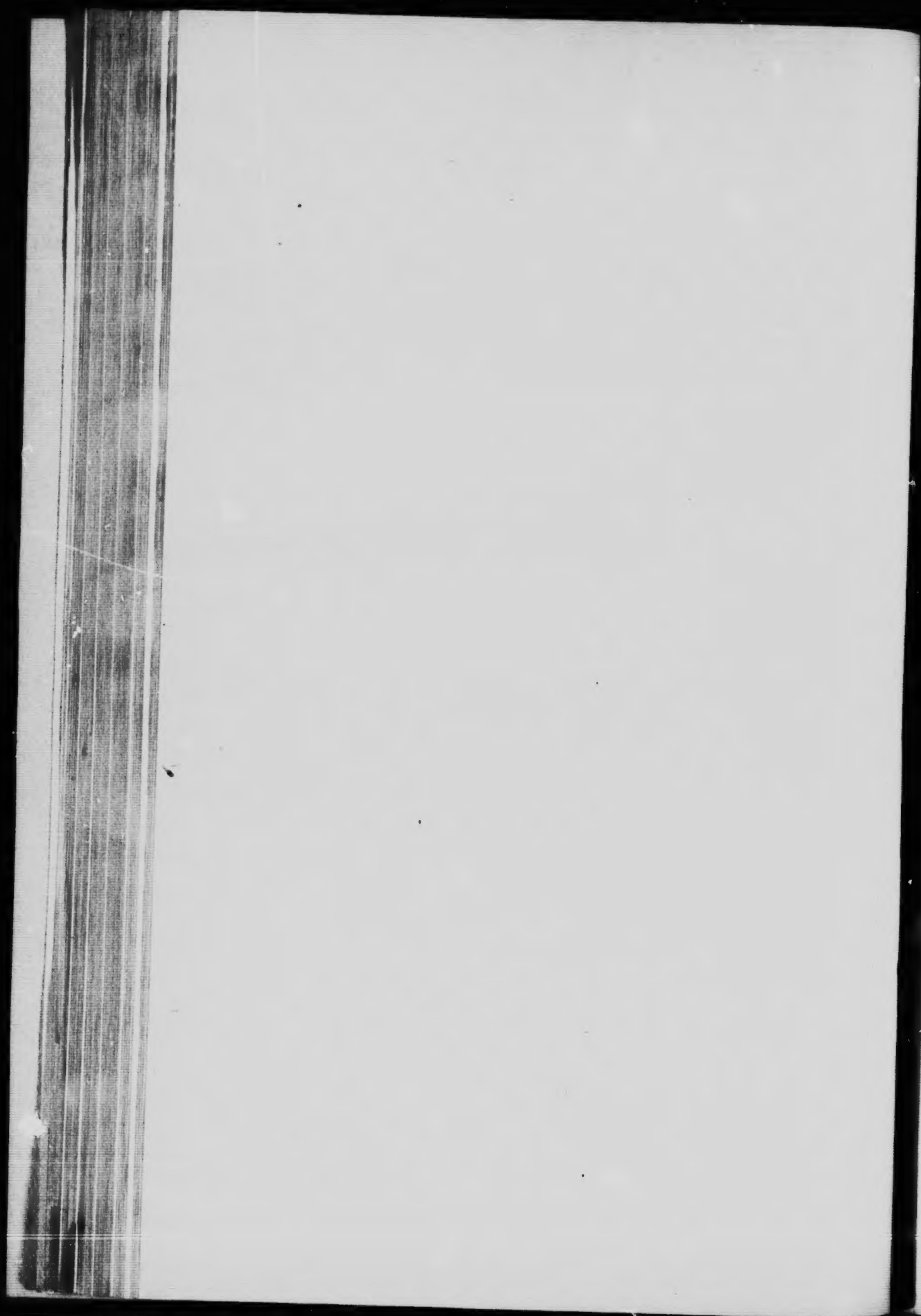
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DEPARTMENT OF AGRICULTURE
DAIRY AND COLD STORAGE COMMISSIONER'S BRANCH
OTTAWA, - - - CANADA.

COW TESTING

WITH SOME NOTES ON

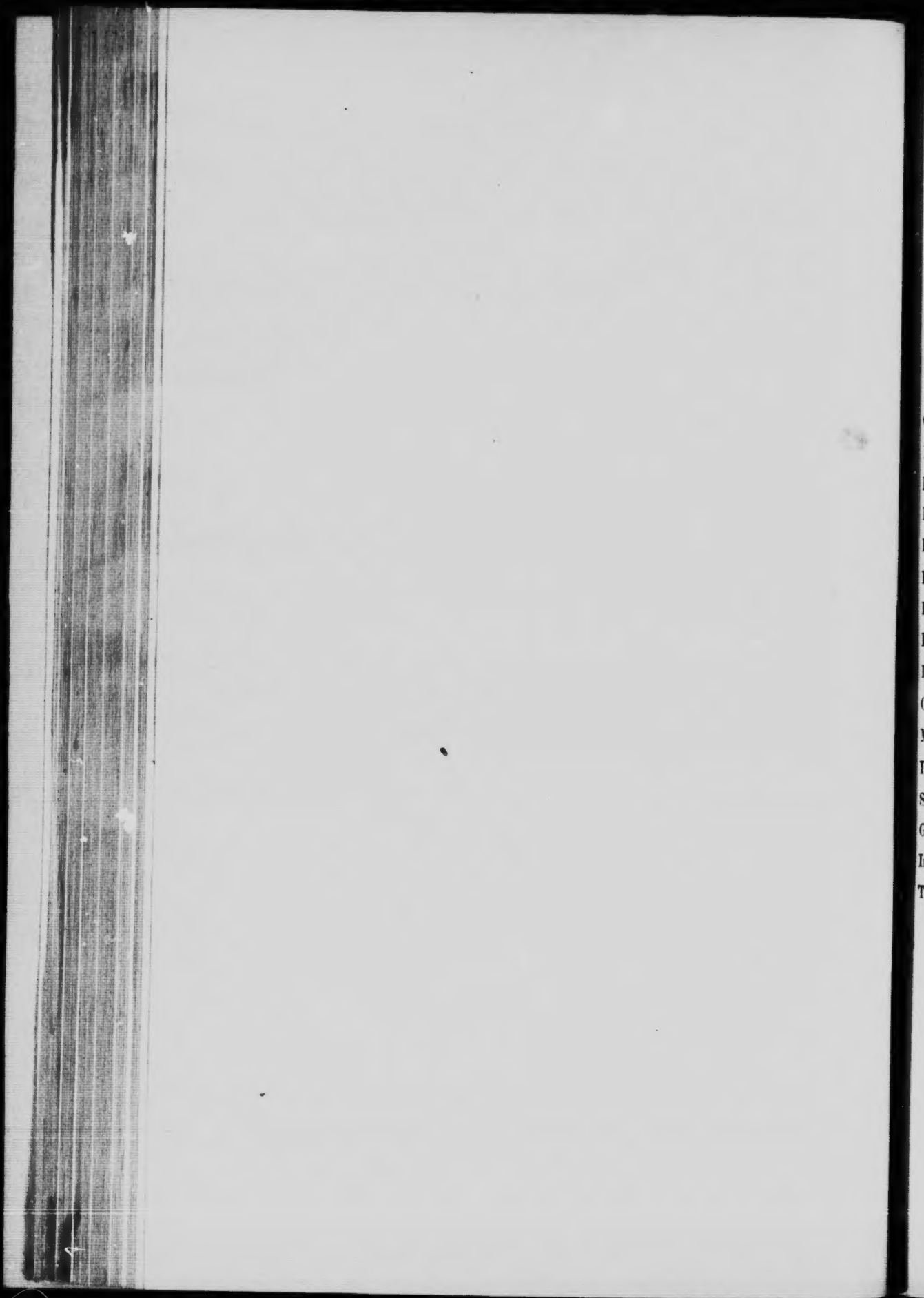
THE SAMPLING AND TESTING OF MILK

By J. A. RUDDICK and C. F. WHITLEY

BULLETIN No. 33

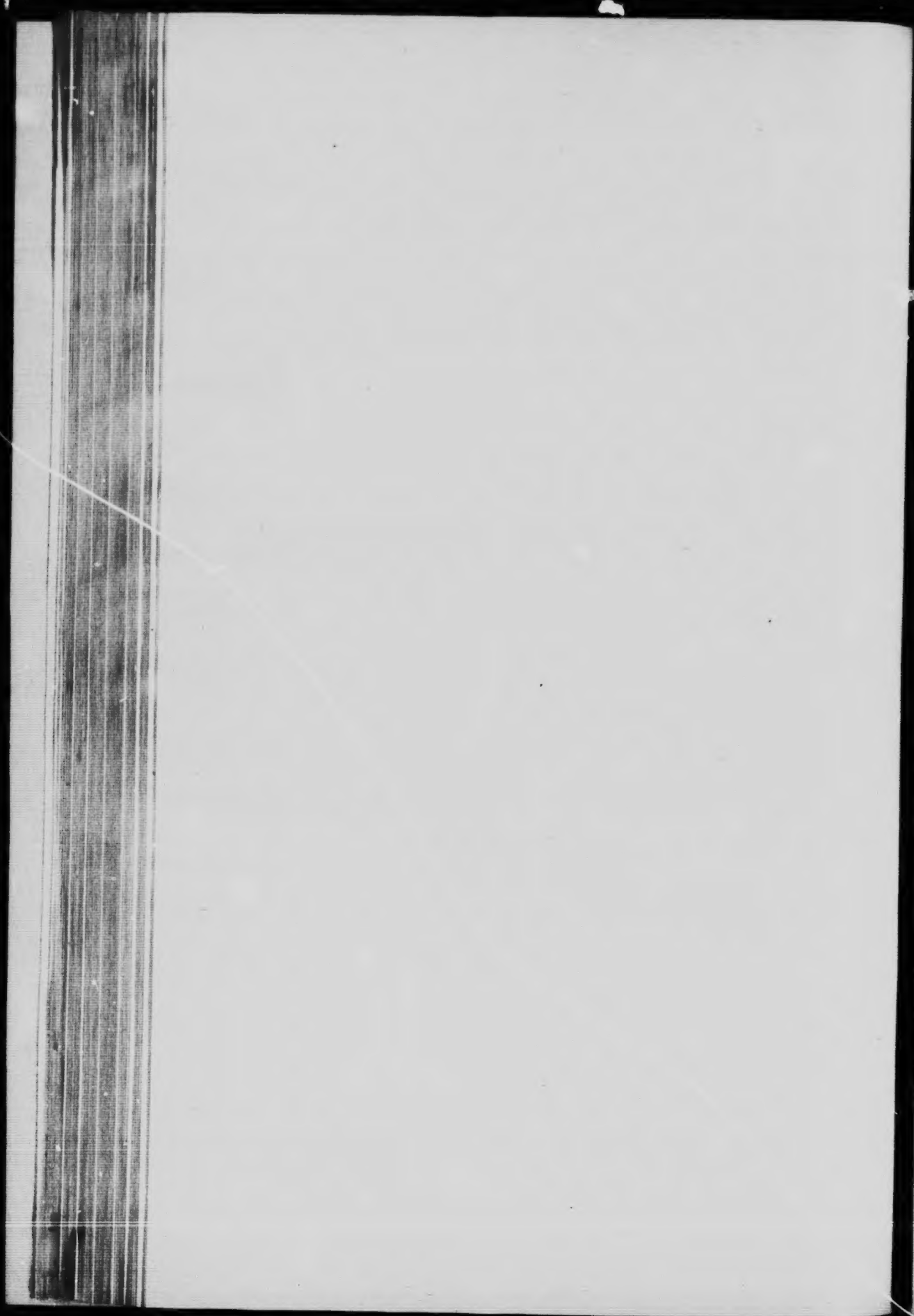
DAIRY AND COLD STORAGE SERIES

Published by direction of the HON. MARTIN BURRELL, Minister of Agriculture,
OTTAWA, ONTARIO.



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LETTER OF TRANSMITTAL.

OTTAWA, May 1, 1913.

To the Honourable

The Minister of Agriculture.

Sir,—I have the honour to submit for your approval the manuscript of Bulletin No. 33, Dairy and Cold Storage Series, entitled 'Cow Testing, with some Notes on the Sampling and Testing of Milk.' This is a revised copy of Bulletin No. 12. The continued interest in the question of cow testing has resulted in a great demand for this publication, and our supply of three large editions is exhausted. Some matter has been compiled from the records now in the possession of this office which will add to the interest and value of the bulletin. I beg to recommend that it be printed for general distribution.

I have the honour to be, sir,

ur obedient servant,

J. A. RUDDICK,
Dairy and Cold Storage Commissioner.

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COW TESTING

WITH SOME NOTES ON

THE SAMPLING AND TESTING OF MILK

By J. A. RUDDICK AND C. F. WHITLEY.

INTRODUCTION.

GREAT POSSIBILITIES FROM SELECTING COWS.

The dairy farmers of Canada are beginning to realize the importance of the question of the improvement of dairy herds, and the possibilities there are in this line of work for increasing the profits of milk production. According to the results which have followed intelligent breeding and selection, combined with good care and feeding, in other lands, as well as the experiences of progressive farmers in this country, it would seem to be possible to increase the average production of Canadian herds by at least 2,000 pounds of milk per cow per year, by applying the same rational methods. Such an increase in production would mean an additional revenue from dairying to the farmers of Canada of at least \$30,000,000 a year, without increasing the number of cows kept.

The plans for the improvement of a dairy herd need not be elaborate or expensive, and should take cognizance of the fact that there are good cows and poor cows, judged by their milk production, in all breeds, and that it does not follow because a cow may have a lengthy pedigree that her performance at the milk pail is up to the mark; that there are 'scrub' pure breds as well as common 'scrubs.' It will require some moral courage to discard the expensive pure bred scrub after she has been shown up in her true colours, but that is what should be done. There is only one true standard, and the test must be production. This is not an argument against the pure bred animals as such, but rather an attempt to place performance ahead of pedigree. Ancestry is a most important consideration, but unless the record carries with it some account of production, it lacks the only really important feature, and the man looking for superior animals gets no information from it that is of real value to him. He may have personal knowledge of the strain in question, but that is another matter.

Any scheme which has for its object the improvement of our dairy stock must provide for a study, and record, of the performance of the individual cow, as well as deal with the management of the herd, including its care and feeding, and the breeding of animals to replace those which are discarded in the 'weeding' process. Individuality can only be determined by the weighing and testing of each cow's milk.

It is quite practicable for individual farmers to test their own herds, and many are doing so, but some form of co-operation makes the work easier and cheaper and at the same time more useful, inasmuch as each member of an association has the information relating to other herds as well as his own.

MAKERS AND FACTORY OWNERS SHOULD BE INTERESTED.

Cow testing is distinctly and immediately of value to every factory owner, for several good reasons. If farmers supply more milk or cream from a given number of cows or a certain number of acres, it means that by receiving more raw material from the same territory there is a lessening in the cost of hauling and a lowering in proportion of the expense of making, while a longer factory season is possible as the milking period is extended. Further, directly a patron begins testing each cow individually he commences to take far more interest in the herd and is likely to supply not only more, but a far better quality of milk or cream, cared for better.

With the strong probability of having the milk in the vats in far better condition every day, thereby facilitating his work at every step, it is clearly of great importance to every cheese and butter maker to follow this matter up and make it a point to interest every patron in cow testing.

Farmers who may desire to organize cow testing associations are invited to correspond with the Dairy Commissioner regarding the assistance given by the Department in the organization.

COW TESTING ASSOCIATIONS.

It is probable that the most popular plan for getting the testing done will be through the organization of Cow Testing Associations. There are some two hundred of these associations already in existence in the Dominion, which have been organized by the members of the Dairy and Cold Storage Commissioner's staff, and the number is increasing rapidly. The organization is being effected on the following basis:—

RULES AND REGULATIONS.

1. The organization shall be known as the Cow Testing Association.
2. The officers shall consist of a president, a vice-president and a secretary-treasurer. Three other members shall be appointed to act along with the officers as a committee of management.
3. The officers shall be elected to hold office for one year or until their successors are elected.
4. The annual meeting shall be held at the call of the president.
5. Meetings of the committee of management shall be held at the call of the secretary-treasurer. Three members shall form a quorum.
6. Any person who will agree to keep a record of individual cows during the whole milking period, to the extent of weighing the morning's and evening's milk on at least three days every month, and also to take a sample each time for testing, will be admitted to membership. The number of members may be limited at the discretion of the committee of management.
7. The milk will be preserved and a composite sample tested once a month with a Babcock milk tester.
8. Members will be expected to provide themselves with scales, dipper, sample bottles, one for each cow, and a box for holding the samples.
9. Members shall assume the responsibility of delivering the samples to the place where the testing is to be done, on such days as may be directed by the person in charge of that work.
10. The association agrees to provide a suitable machine and place in which the testing may be done without cost to the department.

NOTE.—A cheese factory or a creamery is a natural centre for an association of this nature. The facilities for testing are available at any properly equipped factory, and the samples can be delivered easily on the regular milk wagons.

FREQUENT WEIGHING ADVISED.

While the weighing and testing of the milk on three days a month is considered sufficient to estimate the total yield of milk and fat, more frequent weighings are recommended if a careful study of cause and effect in milk production is to be undertaken. If the milk is weighed every day, any abnormal variation between milkings is at once noted and the cause more easily assigned than when the variation is found after an interval of ten days. The good or bad effect of particular treatment or circumstances is at once impressed on the notice of the owner if the matter is reflected at the scale.

Forms for recording weights of milk may be had on application to the Dairy and Cold Storage Commissioner, Ottawa.

State in your letter whether forms are required for weighing on only three days per month, or for weighing daily.

PERSISTENT WORK WILL BE REQUIRED.

It is useless to begin this work unless one is prepared to follow it up faithfully and persistently, year after year, and make use of the information respecting the individual merits of his cows. Testing should begin as soon as the cows come in milk, and be continued until the milking period is over. With one full season's record to guide him, the owner of a herd is in a position to begin his process of intelligent 'weeding' and to lay plans for future breeding. As many as practicable of the poorest cows should be discarded. Theoretically, all cows which do not come up to a certain standard should be got rid of, but in practice it is useless to turn off any animal unless there is some certainty of being able to replace them with better ones. It is hardly wise to set up any arbitrary standard. Much depends on the character of the herd to begin with, and, moreover, as the average of the herd is improved, the standard should be raised. It may be pointed out in this connection that the Danish associations are continuing their work as energetically as ever, though the average of many herds has reached such a high level as 10,000 to 12,000 pounds of milk per year.

It is desired again to call particular attention to the need of keeping records for the whole period of lactation, and not simply for a few months. If any close estimate of profit is to be arrived at, it is useless to make only a guess at the production of milk and fat for four or five months while but a very little extra time, when figures are already recorded for seven or eight months, will give definitely the whole year's result. The completed totals will be of infinitely more value to the owner himself, besides rendering valuable service to dairymen all over Canada through making it possible to compare results of hundreds more herds and individual cows.

IMPORTANCE OF FEEDING.

Because there is no reference to the feeding of the cows in the rules and regulations of the Cow Testing Associations, it does not follow that this phase of the question is considered unimportant or that it should not form a part of the general scheme for the improvement of the dairy herds. For the present, however, we do not insist on this feature, believing it best to get the testing well established first.

Forms for recording the feed consumed by each cow may be had on application.

INCREASED PRODUCTION MAY MEAN INCREASED CONSUMPTION OF FEED.

It is quite probable that an increase in the yield of milk will not be secured without some increase in the quantity of feed consumed. If so, all the better, provided that the same proportion of milk is produced per feed unit. The cow, in this sense, may be regarded as a 'machine' for converting a bulky raw material into a more concentrated and highly finished product. The greater the capacity of the machine

the more profitable its operation, unless the forcing process entails undue waste. There is undoubtedly a difference in 'efficiency' of cows in this respect, and here where careful observation and record of the feed consumed becomes important. This is another phase of the feeding question which requires consideration. The relative cost of different feeds is not always in accordance with their milk-producing value. It is quite possible to feed a cow expensively and not produce any better results than could be obtained with other feeds or combinations costing much less. The consideration of this side of the subject goes back to the choice of fodder crops best suited to the particular farm occupied. On this point we would refer again to the Danish experience, for they have been able to increase largely the yield of milk per cow and still produce as much milk per 100 feed units as they did when the yield was smaller.

PROFIT PER COW.

It is recommended, as both interesting and valuable, that the yield of each cow be entered up each month in a book. At the end of the year the cost of feed should be deducted so as to show the net profit made by each cow above the cost of feed.

A convenient herd record book may be obtained on application.

IMPORTANCE OF A GOOD SIRE.

The greatest curse that dairy farming in this country has known is the 'scrub' bull, be he mongrel or pure bred. It is absolutely useless to attempt any great improvement of the herd unless careful attention is given to the selection of this all-important member. He is truly the 'head of the herd,' and cannot be too carefully selected from a strain which has a record for large milk production. The services of such an animal are valuable beyond comparison with one of indifferent breeding. It is the part of wisdom to see that such a bull serves none but those cows which come up to a good standard. Many farmers feel that they cannot afford to purchase expensive animals, but why should not several farmers co-operate in the purchase and use of bulls of the right sort? Why should not the Cow Testing Associations take up the question of securing bulls for their exclusive use and mate them only with the best cows?

THE COW TESTING OUTFIT.

To weigh and sample the milk for testing, the following outfit is required:—

*A straight spring scale (fig. 1), capacity 40 lbs. costing about.	\$1 25
A sample bottle for each cow (fig. 3), costing about.	0 75 per doz.
A sampling dipper (fig. 4), costing about.	0 15
A box for holding samples (fig. 5), costing about.	1 00
One package of 500 preservative tablets, costing about. . . .	0 90

Such equipment can be obtained through the regular dairy supply houses. This department does not supply the articles.

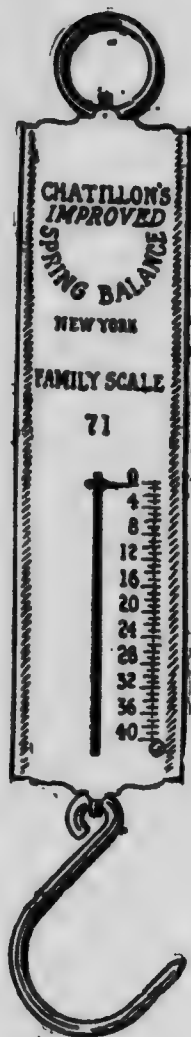


FIG 1.



*FIG 2.

*These scales, to weigh 30 or 60 pounds, are made with a loose pointer which, by means of a thumb screw on the centre, may be set anywhere on the dial, thus taking the tare of a milk pail.

*A circular dial spring scale (fig. 2), costing about \$1.50, is more convenient.

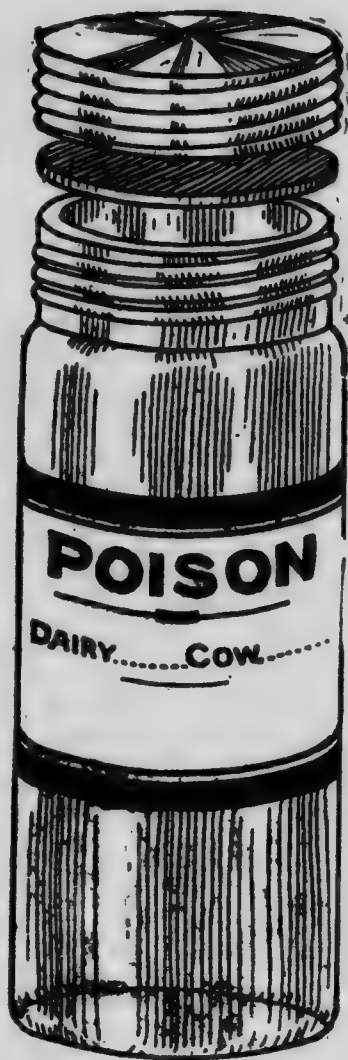


FIG 3.
This bottle has a screw metal cap and a rubber washer. Capacity, 4 ounces.



FIG 4.
Six of these dippers full should just fill the sample bottle.

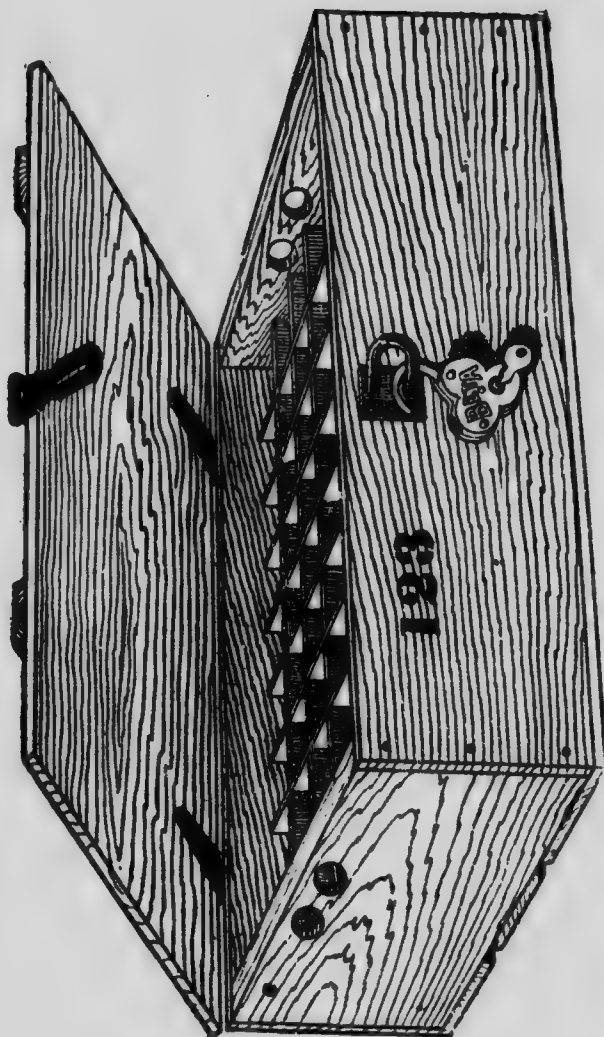


FIG. 5.

Each bottle may have a label pasted on it bearing the 'herd number' and a number or name for each cow.

NOTE.—Two coatings of white shellac over the label, put on well round the edges, will prevent it soaking off when the bottles are washed. Another plan is to paint the cow's number on the bottle and on the cap with black stove varnish. These articles, with the following form for recording the weights of milk, make up the outfit required.

INDIVIDUAL COW MILK RECORD.

For 30 days ending.....
 Name.....
 P.O.....
 Province.....

DESCRIPTION OF COWS.				3 DAYS' WEIGHINGS OF MILK.			Total Pounds of Milk Calculated for 30 Days.		Butter Fat.	
Name.	Breed.	No.	Age.	Date of last calf.	Dates.			Per cent.	Total pounds.	
		1			A.M.	16	16			15
					P.M.	154	144	15		
		2			A.M.					
					P.M.					
		3			A.M.					
					P.M.					
		4			A.M.					
					P.M.					
		5			A.M.					
					P.M.					

This form may be extended to take records for more cows. Copies, ruled for 18 cows, may be obtained on application to the Dairy and Cold Storage Commissioner, Ottawa. State in your letter which milk record form is required; that for daily weights, or this one for 3 days per month.

It will assist in keeping correct records if the name of the cow is given as well as her number. The details of age, breed and date of calving need be given only once, but make certain of having these particulars of each cow. State whether grade or pure bred.

Each cow must keep her own number right through the season. If she goes dry, and freshens again during the year, she must appear on the record again under her original number.

If a cow is disposed of, state for what reason.

INSTRUCTIONS FOR MEMBERS OF COW TESTING ASSOCIATIONS.

These instructions apply also for the individual dairyman who is preparing to test his own cows.

One of the blank record forms should be posted in the stable, on a board with a pencil attached, in a convenient and well lighted place; the spring scale should be suspended close by.

Weigh the milk from each cow, morning and evening, on the three dates given at the top of the columns for recording weights of milk.

Give fair weight, and enter the weight in the proper space; be sure to deduct weight of the pail.

The dates for weighing and sampling should occur every ten days, for instance, January 10, 20 and 30, and the totals of these weights multiplied by ten will give quite closely the total yield of milk for thirty days.

TAKING SAMPLES.

Immediately after weighing each cow's milk, pour it into another pail, then back again, and while the milk is still in motion, take one dip of milk with the small dipper provided for the purpose and pour it into the sample bottle, which bears the name or number of the cow. This will make six dips of milk in each bottle during the month, from the six different milkings of each cow. The cap should be kept screwed on the bottle, to prevent evaporation.

Caution.—Keep the box containing the milk samples undisturbed in a cool place and always safely locked to prevent access of children or other inquisitive persons, as the preservative to be used in the milk is generally a **DEADLY POISON**.

One preservative tablet should be placed in each sample bottle, which should be clean and dry, before the first sample of milk is taken.

When the sixth sample is taken, make a clean copy in ink on the other blank form and inclose it in the box. Be sure to give your name and address.

IMPORTANT.—THE BOX MUST BE RETURNED TO THE TESTING STATION IMMEDIATELY AFTER THE SIX SAMPLES ARE TAKEN.

CALCULATING MONTHLY TOTALS.

The total weight of milk given in the three days when multiplied by ten gives the record for each period of thirty days.

If six milkings a month are to be recorded as herein advised, the percentage of fat in the composite sample may be ascertained after six samples are taken, and the yield of butter fat readily calculated. To obtain the approximate yield of butter, add one-sixth the quantity of fat. Thus if the six weighings of milk on the three days during the month are 16, 15½, 16, 14½, 15 and 15 pounds, respectively, the total of 92 multiplied by 10 will give 920 pounds of milk, the total weight of milk for the month: this testing 3.6 will yield 33.1 pounds of fat; or if one-sixth be added, a total yield of 33.6 pounds of butter for the month.

SOME DEFINITE GAINS FROM COW TESTING.

Attention is particularly directed to the following records and statements by the owners of the herds, especially the first four. The remarkable increases in the yields of milk and the cash income per cow should stimulate every dairyman in Canada.

Mr. S. A. Freeman of Culloden, Ont., handling a large herd, has the following record:—

First year, seventy cows gave an average yield of 5,149 pounds of milk.

Second year, seventy cows gave an average yield of 5,871 pounds of milk.

Third year, sixty-five cows gave an average yield of 6,211 pounds of milk.

Fourth year, seventy cows gave an average yield of 6,708 pounds of milk.

The yield in the fourth year is all the more noticeable as it includes the production of seven 2-year olds; twenty of the best cows averaged 8,724 pounds of milk. Thus in four years, there is an increase of 1,650 pounds of milk, or 32 per cent.

Mr. Freeman writes: 'The last three years I have culled out from eight to ten cows each year; they have mostly been sold for beef. Some nice black and white ones have been bought by dealers and sold in auction sales for dairy cows. One in particular was below my average; I sold her for \$45; she brought at the sale \$75. I have sold ten this year; they were mostly 5,000 pound cows, five and six years old—not much prospect of them doing better. They all went for beef without any extra feed. Have seven 2-year old heifers to take their place, have bought five more, lost one cow. Have twelve yearlings to replace next year's culls. I can't hope to get any better herd than I have at present, unless I raise calves from my best cows. I can't afford to pay \$100 and upwards for cows that are only grades to put in a large herd and run chances of them keeping up to their former yield. I hope to reach a standard of 8,000 pounds per cow for seventy cows. If we have a good year we will give it a close rub. It is a hard job to keep up and increase the standard in a large herd; one cow that headed the herd three years ago lost a quarter last spring, the one that was best two years ago died this spring, another one of my very best lost two hind teats last spring, she gave 18 pounds at a mess from her two teats, am keeping her on this year I will continue weighing the milk this summer.'

It is evident that it must take very careful management to handle such a large herd so successfully, and it will be noticed that Mr. Freeman is still not satisfied with present attainments, but is aiming still higher; 8,000 pounds of milk from 70 cows as an average yield might well encourage other milk producers.

Another very noteworthy instance shows a good average almost doubled inside seven years. Mr. W. E. Thomson, of Woodstock, Ont., states that *he has increased the yield of milk from about 5,000 pounds of milk per cow to 10,500 pounds in seven years* through using a pure bred sire and selecting the best milkers. He states that the cow testing association records have been a great help to him.

Mr. Thomson writes: 'It has always been my practice to raise my own heifers from my best cows, and then to feed and care for them in such a way as to enable them to do the most at the pail. I have only bought four or five since I started into business and they were pure bred cows. The first year I kept records I sold six to a butcher; these were cows I had bought at farm sales to start with. All cows sold after that were sold as milkers. A cow that will not give seven or eight thousand pounds of milk for me in ten months must go. I hope to have all mature cows give an average of one thousand pounds of milk per month.'

Again near Woodstock, Ont., is to be found a most encouraging average and a splendid increase. The herd of 20 cows belonging to Mr. A. J. Davis has been built up from grade Shorthorns of decidedly beef tendency, and *the yield has been doubled in 6 years* (the average was 4,500 pounds of milk per cow, and six years later it was 9,144 pounds per cow), by the use of a pure bred dairy sire, selecting the best heifers from year to year, and culling out the poorest cows.

Cows are fed liberally, but cheaply, considering the amount of milk they give.

Mr. Davis believes in keeping heifers milking at least 12 months the first season, as he is more likely to get persistent milkers than if they were dried up at the end of 7 or 8 months. The first cross of heifers gave 6,500 pounds (Holstein sire, Shorthorn cows), just 2,000 pounds more than the mothers, which were mature cows.

Two most important points are that the present excellent dairy herd has been built up from a beef breed, grade Shorthorn cows, and *the yield has been doubled in 6 years*. The variation runs from 7,070 pounds to 12,690 pounds of milk per cow.

Mr. R. J Smart, Scotsburn, N.S., gives the following statement regarding his herd:—

FIRST YEAR.

Six cows, from June 17 to Sept. 30, gave....	376 pounds of fat worth	\$58 19
Six cows, from Oct. 1 to Dec. 31, gave.....	78 " "	17 92
Total..	354	\$76 11

SECOND YEAR.

Four cows from May 11 to Sept. 30.....	405 pounds of fat	\$96 02
Four cows from Oct. 1 to Dec. 31.....	135 " "	35 29
Total..	540	\$131 31

THIRD YEAR.

Six cows from May 12 to Sept. 30.....	620 pounds of fat	\$145 39
Six cows from Oct. 1 to Dec. 18.....	245 " "	66 34
Total..	865	\$211 73

Previous to this past year he did not test regularly, but tested a month or two at a time, occasionally, for a number of years, and thereby got some idea of his cows, and started selling off the poorest ones, but found difficulty in buying good ones, and only getting them by breeding from his best cows. A pure bred Guernsey sire is now being used for the fourth year.

Previous to the first year's test, no winter dairying was carried on. This winter the average is between twenty and twenty-five pounds of butter per week.

In addition to the receipts given above enough milk and cream were kept at home for family use all the year, which would mean the yield of at least one cow. The past year two of the herd were 2 year old heifers.

Vetches and oats are grown for early fall feeding, and cured for winter feeding. Winter feed consists of clover hay, a few roots and buckwheat-chop, with a few hundred of cottonseed and beans.

Mr. Smart considers a very important point in summer is to change pasture frequently and not put the cows out in the spring until the grass has a good start; also to leave the cows out at night during the hot weather. A great many keep their cows in at night all summer.

It will be observed that the cash income per cow in this herd is practically *three times as much* as it was four years ago.

(Extracts from the Reports of the Dairy and Cold Storage Commissioner.)

During 1912 the number of cows recorded each month in the office at Ottawa varied from 1,397 in February, to 11,912 in July, with a total of 81,168 tests of individual cows for fat during the year. The average test was 3.66 per cent of fat.

GOOD REASONS FOR COW TESTING.

From correspondence with members of cow testing associations the following good reasons why every dairy farmer should commence and continue the system have been classified.

Individual Cows.

1. Cow testing enables one to find out the poorest cows, those not paying for their feed, so that they may be got rid of.

In many cases one-quarter of the cows in the herd have been discovered to be not worth keeping, in some cases half the herd and even as high as three-quarters have been turned out.

This means certainty in dairying, no more guess work as to individual performance.

2. Cow testing shows that many cows considered only average are really the best in the herd.
3. Cow testing points out definitely which cows are the best producers, both in milk and butter fat.
4. Cow testing proves that many cows considered the highest in test are really the lowest.
5. Cow testing saves good cows from being beefed, they are found to be profitable when actual yield and cost of feed are considered.
6. Cow testing shows that many fine looking cows do not bring in much cash from the factory.
7. Cow testing helps to discover the great difference in persistency of flow.
8. Cow testing brings to notice the slightest variation in flow and urges one to seek for the cause of the shrinkage.

Herds as a Whole.

9. Cow testing helps to increase the total yield of milk and fat from the same number of cows.
10. Cow testing brings in larger returns from fewer cows.
11. Cow testing helps to build up a profitable herd quickly because heifers can be selected from the best cows.

Feed.

12. Cow testing allows more discrimination in feeding, apportioning the grain according to the yield of fat.
13. Cow testing emphasizes the benefit of liberality in feeding succulent, digestible food stuffs.
14. Cow testing abundantly proves that it pays handsomely to give dairy cows the best of care and kind treatment; this includes regularity as to milking, early stabling in the fall, protection from cold rains, spraying to protect from flies; and above all, particular attention to cleanliness, light and ventilation in the stable.

15. Cow testing demonstrates that many good cows can be kept at a smaller cost of feed. This is not stinginess, but economy.

The Dairyman Himself.

16. Keeping records makes one more observant of all those little details that go to make up success.
17. Because cow testing develops this faculty of observation and induces reading and study, members of associations are becoming far better dairymen.
18. There is a great stimulus received from comparing notes and results with other members.
19. The hired men take more interest in the cows, consequently they give them better attention and get more milk.
20. Neighbouring farmers who originally scoffed at the idea of cow testing have become impressed with the results obtained by members.
21. A great measure of personal satisfaction results from studying each cow as an individual performer, not as a mere machine.
22. Cow testing increases one's love for good cows, and creates infinitely more pleasure in the work of the farm.
23. The definite knowledge obtained from the regular monthly testing is much more satisfactory in every way than getting an occasional result only once or twice a year.
24. Financially, cow testing is of very great benefit; young bulls sell for higher prices. Cows sell for double the old prices when buyers see records.
25. Cow testing not only interests the boys and girls more and more in farm life, but materially assists in providing additional home comforts for the women and children.

INCREASES IN YIELDS.

A few of the positive gains in milk yields and cash receipts are given below as samples of what is being accomplished by men who take up cow testing systematically.

ONTARIO.

Dr. D. Robertson, Milton, writes, 'Our herd of cows averaging 4,000 pounds of milk six years ago, now average over 8,000 pounds.' The yield of this herd is thus seen to be *actually double* what it was.

W. R. Bigham, Culloden, writes, 'We have increased the average yield per cow about 2,000 pounds, our herd averaged about 7,300 pounds last year.'

Wm. Stock, Cassel, writes, 'My herd has increased from 5,000 to 8,000 pounds for each cow in two years.' This is a *60 per cent increase*.

E. Mollen, Cambray, writes, 'I have achieved an increase of at least twenty-five per cent.'

J. W. Jewson, Stone Quarry, writes, 'We have a marked increase in pounds of milk produced, in some cases equal to 1,000 pounds per cow.'

E. O. Finch, Mapleton, writes, 'All the herd show a large increase, one four-year-old gave 12,000 pounds of milk.'

Jonathan Austin, Lynn Valley, writes, 'My herd now averages over 6,000 pounds per cow.'

George Bishop, Norwich, writes, 'Two years ago before keeping records our herd of 12 cows averaged less than 6,000 pounds; this year, 12 cows average over 8,000 pounds.' This is an increase of *over 33 per cent*.

W. E. Thomson, Woodstock, writes, 'I have raised the average of my herd from 5,500 to 10,400 pounds per cow.' This is a case where the yield has been almost doubled.

William Kaufman, Cassel, writes, 'My cows gave me about 1,000 pounds more milk this year than last.

Thos. F. Ritchie, Allan's Mills, writes, 'My five best cows gave over 1,100 pounds more milk in June this year than in June last year.'

Walter Paterson, Ingersoll, writes, 'Three years ago the average of 11 cows was 5,852 pounds, and now the average of 9, including heifers, is up to 7,446 pounds. This is an increase of 1,594 pounds, or 27 per cent.

Wm. Beddie, Prescott, writes, 'the average yield was 3,794 pounds three years ago, it is now 6,000 pounds.' This is an increase of 2,206 pounds per cow, or 58 per cent in three years.

J. K. Moore & Son, Peterborough, with a herd of twenty, increased the yield 2,269 pounds of milk per cow in two years, or 33 per cent.

H. German, St. George, writes, 'Our increase is from 7,000 to 9,000 pounds of milk per cow.'

QUEBEC.

Chas. Wilkins, East Farnham, writes, 'Two years ago our cows gave a revenue of \$20 each, but last year it was \$41.43, or more than twice as much.

S. W. Talmadge, Sweetburg, writes, 'My cows are doing about one-half better.'

Geo. H. Montgomery, Phillipsburg, writes, 'The revenue was increased \$20.04 in four years.' This is equivalent to a gain of 32 per cent.

H. F. Green, Clarenceville, writes, 'Our cows have increased the flow of milk one-third.'

H. D. Snow, Coaticook, writes, 'Our average yield has increased at least twenty-five per cent.'

D. F. Hawley, Nutt's Corner, writes, 'We have made a twenty-five per cent gain.'

S. A. Cleland, Hemmingford, writes, 'Previous to weighing and keeping records, our average returns per cow were only about \$40, last year it was \$60.' This is an increase of 72 per cent.

W. P. Dimick, South Stukeley, writes, 'It would be hard to estimate the value of cow testing in dollars and cents as yet, but I would not take a good deal for the knowledge I now have.'

F. E. Miller, Clarenceville, writes, 'The returns from my eleven cows this year exceeded those of last year by \$150.'

W. F. Kay, Phillipsburg increased the yield from 5,218 pounds of milk from 13 cows, to 6,482 pounds from 17 cows in four years. This is 24 per cent.

Geo. Bradley, St. Armand, has increased in three years from 3,986 pounds per cow to 5,061 pounds. This is 27 per cent.

W. Auger, Ste. Emilie de Lotbinière, has increased in three years from 3,275 pounds per cow to 4,303 pounds. This is 31 per cent.

Theo. Trudel, St. Prosper, with 15 cows has raised the average from 5,534 pounds per cow, to 6,725 pounds in three years.

R. H. Reynolds, Aird, two years ago had an average of 3,792 pounds of milk from 10 cows, but last year his 12 cows averaged 7,269 pounds of milk and 230 pounds of fat. This is an increase of 31 per cent in the yield of fat, and 91 per cent in the yield of milk.

M. T. Macfie, Aird, also in two years has increased 61 per cent, from 2,861 pounds of milk up to 4,602 pounds per cow.

T. B. Stark, Kelvingrove, with 13 cows averaged 4,199 pounds of milk, but in two years the average yield of 15 cows was 5,760 pounds of milk, or an increase of 37 per cent.

Trefflé Morin, Notre Dame de Stanbridge, writes, 'Our cows have increased 1,000 pounds of milk on the average over last year.'

Cyrille Laurin, fils, Côte St. German, writes, 'We have made over \$15 per cow more this year.'

MARITIME PROVINCES.

Robert Murray, Marshville, N.S., writes, 'From 4 cows two years ago I sold 587 pounds of butter; from 6 cows this year I sold 1,400 pounds.' This is an increase of 68 per cent.

Hugh J. McLeod, Heathbell, N.S., writes, 'We are getting about 50 per cent more milk.'

Byron McLeod, Penobscuis, N.B., writes, 'The average of butter fat increased twenty pounds per cow this year.'

J. L. Blakeney, Victoria Mills, N.B., writes, 'We are getting at least one-quarter more milk.'

Ora C. Hicks, Petitcodiac, N.B., writes, 'We have greatly increased in total of milk from the same number of cows.'

S. J. Goodliffe, Sussex, N.B., writes, 'In seven years the average was brought up from 4,590 to 7,835 pounds of milk per cow.' This is an increase of 70 per cent.

M. A. Smith, Hoyt Station, N.B., writes, 'I have just about doubled the average yield of milk.'

T. W. Bentley, Kensington, P.E.I., writes, 'My increase is about \$15 per cow in three years.'

P. S. McIntyre, Kensington, P.E.I., writes, 'Our six cows increased 4,800 pounds over last year.'

W. D. McCormick, Launching, P.E.I., writes, 'Our cows have increased 2,000 pounds of milk.'

M. C. Quigley, North Tryon, P.E.I., writes, 'I am getting about \$20 per cow more.'

A. McRae & Sons, East Royalty, P.E.I., writes, 'We are averaging at least one-third more per cow.'

J. Seaman, Breadalbane, P.E.I., writes, 'My herd now gives me three times as much milk per cow.'

BRITISH COLUMBIA.

Halliday Bros., Sandwich, write, 'We have more than doubled our output.'

G. S. Harris, Moresby Island, writes, 'I have raised my average yield of fat nearly 40 pounds per cow.'

G. G. Baiss, Maple Bay, writes, 'In 3½ years the average per cow has increased from \$7 per month to \$12 per month.' This is over 71 per cent.

A. W. Haine, Dewdney, writes, 'In 5 years we have raised the average more than 2,000 pounds of milk per cow.'

Horatio Webb, Sardis, writes, 'The average of my herd has increased one-third in the amount of butter fat per cow.'

The increases detailed above, coupled with those published in the report of last year, furnish the strongest possible incentive for every dairy farmer to test each cow in his herd systematically. Such results mean definite saving of time, energy, feed and thought at present bestowed on cows not worth keeping; and mean, besides the very satisfactory increases in cash receipts, a decided raising of the whole tone of dairy farming.

SOME NOTES ON THE USE OF THE BABCOCK MILK TESTER.

TESTING THE COMPOSITE SAMPLES.

Up to the present time no simpler or more accurate method of testing for fat has been devised than the well-known Babcock milk tester. With a little practice there is no reason why the careful farmer (or some methodical member of the household) should not do his own testing satisfactorily.

A two-bottle machine is the smallest made, and costs about \$4.50. Other sizes are 4, 6, 8, 10, 12 and 24 bottles. When steam is available the steam turbine tester will be found most convenient and satisfactory. About 35 pounds steam pressure is required to operate a turbine tester.

It is advisable to mix any cream that may have risen on the composite sample, by pouring the milk carefully two or three times from one bottle to another. Do not shake it, or partial churning may result. The test is worse than useless, quite misleading in fact, unless the cream is thoroughly mixed with the milk, and the sample taken is a fair average of the milk to be tested. Some samples may require to be warmed in hot water to about 110 degrees F. in order to loosen the cream which has become attached to the sides of the bottle. Should a sample be sour and thick, add a small quantity of powdered lye, mixing it in thoroughly till the curd is dissolved and the milk becomes fluid again.

With a 17.6 c.c. pipette take a small sample of the thoroughly mixed milk, by sucking it up slightly above the mark on the upper part of the stem. Place the forefinger quickly on the top of the pipette to retain the milk, and hold the pipette in an upright position.

Allow the excess of milk to drip out slowly, by allowing a little air to enter under the finger, until the surface of the milk stands exactly at the level of the mark or ring on the neck of the pipette. Place the lower end of the pipette in the neck of the test bottle, not too far in, release the pressure and allow the milk to flow down the side of the neck. By holding both pipette and bottle slightly inclined the air will be allowed to escape without bubbling and causing loss of milk. Blow the remaining drop from the pipette into the bottle. Before adding the acid, bring the milk to a temperature of 60 degrees F.

ADDING THE ACID.

Procure good commercial sulphuric acid, having a specific gravity of 1.82 or 1.83. Keep the acid bottle tightly closed with a glass or rubber stopper. If an acid burette or other measuring device is not used, the acid may be poured from a small mouthed earthen or glass pitcher into the 17.5 c.c. acid measure, which is usually supplied with the machine.

Great care should be exercised in handling sulphuric acid (oil of vitriol), as it is intensely corrosive and will burn the skin or clothing quickly should it come in contact with either. Any stray drops should be wiped up immediately, using plenty of water. It is a good plan to have a supply of household ammonia handy, which will help to counteract any burning of skin or clothes, if applied immediately.

Holding the test bottle containing the milk at a moderate slant, pour the 17.5 c.c. acid in very carefully, allowing it to flow slowly down the side of the neck, and on no account to drop straight on the surface of the milk. The acid and milk will form two distinct layers, with the acid at the bottom, showing a slight brownish colouration where they touch. Have the acid also at 60 degrees F.

The milk and acid may be mixed by giving the bottle a careful rotary motion. This must be very cautiously done to avoid shaking any curd into the neck. Continue shaking until all the clots are completely dissolved. Be careful to have the mixing thoroughly done.

WHIRLING.

When the milk and acid are thoroughly mixed, place the bottles in the machine so arranged as to balance it. If an odd number of samples have to be tested, an extra bottle filled with water may be placed in the machine to make it run smoothly. Precaution must be taken to keep the fat melted, but do not let the temperature run above 130 degrees F. Hot water may be put in the body of the tester to keep the samples warm.

The bottles should be whirled for five minutes at the speed indicated on the machine. This will vary from 700 revolutions per minute for a machine twenty inches in diameter up to 1,200, for machines of smaller diameter.

Hot water, preferably rain water or condensed steam, at a temperature of 135 degrees F. must now be added to each bottle. Hard water may be used if about 10 c.c. of sulphuric acid is added to each gallon. A convenient method is to use a piece of rubber tubing, provided with a pinch cock, and a glass tip like an eye dropper, leading from the hot water vessel placed slightly higher than the machine. Add enough water to bring the mixture up to the base of the neck and whirl for one minute. Then carefully add more water to about the 8 or 9 per cent mark on the neck of the test bottle and whirl for another minute. The fat should be quite clear and golden in colour when the test is finished. If the fat is very light coloured and there are specks of curd, use a trifle more acid, as it is probably weak. If the fat appears burnt or cloudy, use slightly less acid, and see that the temperatures of milk and acid are not too high.

READING THE TEST.

Hold the bottle level with the eye and perfectly upright. With a pair of dividers measure the extreme limits of the fat column; place one point on the zero mark, when the mark on the scale touched by the other point will indicate the percentage of fat.

Each large space on the graduated neck numbered 1, 2, &c., up to 10, represents one per cent of fat. Each small division represents two-tenths of one per cent. Thus, if reading without dividers and the top of the fat column is at 7.2 with the bottom at 3.3 the sample tested contains 3.9 per cent of fat. If there are many readings to take, keep the fat melted by placing the bottles in water at 130 degrees F. reaching to the top of the fat.

The bottles should be emptied before the fat solidifies, and always kept perfectly clean. A suitable brush may be obtained for cleaning the neck. Hot water and some common shot will scour the lower part of the bottle.

Copies of this bulletin, in English and French, may be procured, free of charge by applying to the Dairy and Cold Storage Commissioner, Ottawa, Ont.